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GALLOWAYINA BROWNI, A NEW GENUS AND SPECIES OF ORBITOID FROM CUBA, WITH NOTES ON THE AMERICAN OCCURRENCE OF *OMPHALOCYCLUS MACROPORA*

BY BROOKS FLEMING ELLIS

Materials from the Upper Eocene beds on the Anaya River one kilometer below Baños, Santa Clara Province, Cuba, have yielded a number of new forms of orbitoids, and the first specimens of *Omphalocyclus macropora* reported from the western hemisphere. One of the new forms is sufficiently different that a new genus has been erected to receive it. This genus has been named *Gallowayina* in honor of Dr. J. J. Galloway, American authority on Foraminifera, and the species for Mr. Barnum Brown, Curator of Fossil Reptiles in the American Museum of Natural History, who collected the materials.

GALLOWAYINA, new genus

TYPE:—The genoholotype is *Gallowayina browni*, new species.

TYPE DESCRIPTION:—Test asymmetrically biconvex, one side being conical and the other nearly flat; surface of the type species rough but not papillate; microspheric nucleoconch probably planispiral, megaspheric one quadrilocular, the small spherical initial chamber partly surrounded by a kidney-shaped second chamber and the two flanked on either side by a hemispherical one, and the four surrounded by a thick fibrous wall; median chambers arcuate, arranged as on the surface of a depressed dome, increasing in size toward the periphery and at the same time rotating, so that, at the edge of the test, they are parallel to and more or less merge with the lateral chambers on the flat side of the test, while standing at a high angle to those on the other side of the median zone; lateral chambers low, thick-walled, perforate, irregular in size and many layers deep on either side of the median layer; pillars numerous on the flat side of the test, often very heavy, but lacking on the conical side, except for a massive plug of shell material extending from the nucleoconch to the apex of the cone. Diameter up to 9 mm., thickness up to 4 mm., with an average diameter of 5–6 mm.

Upper Eocene of Cuba.

Since only one species is known, it is somewhat difficult to determine just which characters are generic and which specific. However much one may question the importance of other characters, the fact that the structure of the nucleoconch is of generic significance is denied by no one; and because of its very distinctive character in this form, it would be neces-

sary to erect a new genus even if the test were symmetrical and the structure of both sides identical. However, the asymmetry is a striking character, manifesting itself not only in the external form of the test but in the internal structure as well, only the nucleoconch escaping its influence. One of the striking features of the internal arrangement is the large number of pillars on the flat side and, with the exception of the apical plug, their complete absence from the conical one; another is the flattening and rotating of the median chambers so that they merge with the laterals of the flat side, near the edge of the test; while the most peculiar feature of all is the doming of the median zone. All or none of these characters may be of generic significance, but the character of the nucleoconch clearly indicates that a new genus must be erected to receive this species.

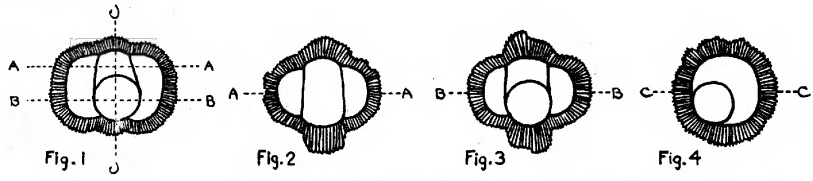

Figure 1.—A horizontal section of the nucleoconch of *Gallowayina browni*, showing the four chambers. The dotted lines show the locations of the vertical sections in figures 2, 3 and 4.

Figure 2.—A vertical section passing through the two hemispherical chambers and the kidney-shaped second one but missing the initial chamber.

Figure 3.—A vertical section, parallel to AA but passing through the initial chamber.

Figure 4.—A vertical section passing through the initial chamber and the kidney-shaped second one.

The significance of the asymmetry is problematic. One explanation is that the animal lived with the conical side of the test embedded in the mud of the bottom. The character of this side seems to support this view, as the absence of pillars and the very small size of the lateral chambers seem to indicate a degenerate condition. Under conditions such as these the warping of the median zone might be explained as an attempt to keep clear of the mud. Another explanation is that the animal lived on a rather firm bottom, with the flat side down, the shape of the test being such as to insure its upright position. Under this hypothesis the restriction of pillars to the flat side might be explained as an attempt to distribute the weight of the test so that the lower side would be the heavier. The apical plug might be the apex of this conical distribu-

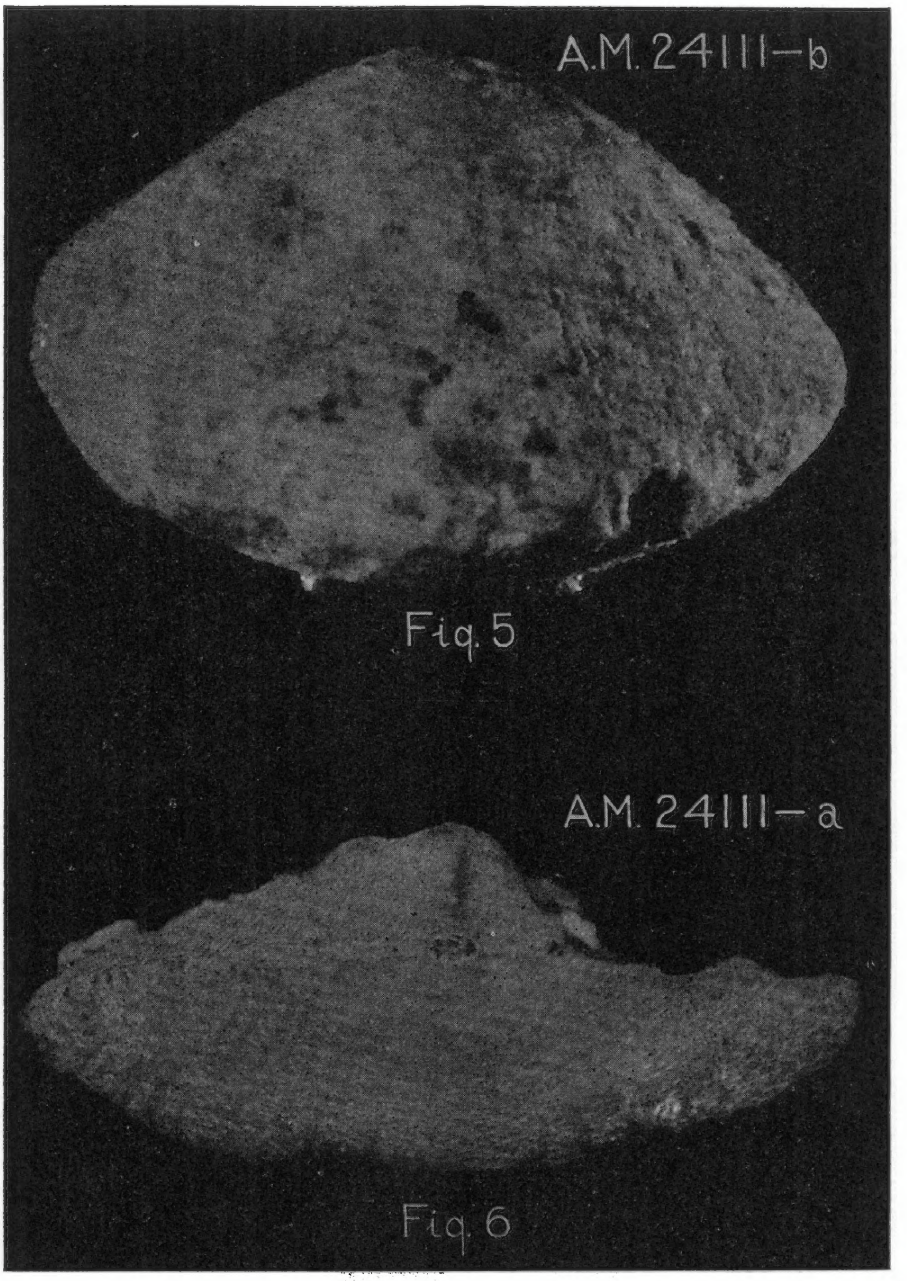

Figure 5.—External view of *Gallowayina browni*, new genus, new species. ×15. American Museum No. 24,111-*b*.

Figure 6.—Vertical section of *Gallowayina browni*, new genus, new species. ×15.. American Museum No. 24,111-*a*.

tion of weight, or the vestige of a pillared condition on the upper side. The fact that it is sometimes absent seems to favor the latter hypothesis.

Gallowayina browni, new species

TYPE:—The holotype is the horizontal section on slide No. 24,111. The vertical section on the same slide is a paratype.

TYPE FIGURE.—Figure 7.

TYPE LOCALITY AND LEVEL:—Upper Eocene orbitoid series immediately overlying the Cretaceous, on the Anaya River, 1 kilometer below Baños, Cuba.

TYPE DESCRIPTION:—In vertical section the nucleoconch may present various appearances, accordng to the orientation of the section, but in reality it is quadrilocular, the group of four chambers being surrounded by a heavy fibrous wall, with the fibers normal to the surface. The nucleoconch measures 300μ by 500μ, and its wall is about 50μ in thickness. The median zone increases in height from the nucleoconch to the periphery, being about 100μ in height near the center of the test and 350μ near the edge. The chambers of this zone have a normal position near the center of the test but farther out begin to swing about in such a manner that, by the time the periphery is reached, they are parallel to and merge with the lateral chambers on the flat side of the test and stand at a high angle to those above the median zone. At the same time the mediam zone as a whole has curved sharply toward the flat side of the shell until at the periphery it has reached it. The lateral chambers are long, low and very thick-walled, the layers completely filling the dome formed by the warped median zone on one side of the test and adding to the height of the cone on the other. Numerous heavy pillars traverse the layers of median chambers on the flat side of the shell, but, except for an apical plug, are absent from the conical one.

In horizontal section the nucleoconch appears quadrilocular, the small initial chamber being followed by a larger kidney-shaped one and the two bounded on either side by a hemispherical chamber This arrangement gives an ellipsoidal nucleoconch. The median chambers are arcuate to rhombic, increasing in length and width toward the periphery. The laterals are very irregular in outline and the walls are pierced by coarse pores.

The microspheric nucleoconch is apparently planispiral.

This form appears to be the American analogue of *Clypeorbis mamillata* (Schlumberger). It differs from the European form in many important respects, however. The megaspheric nucleoconch of *Clypeorbis* is a trochoid spire, while that of *Gallowayina* is quadrilocular. Then, too, the American form is more conical than the European genus, and there is marked difference in the form and arrangement of the median chambers. Also the median zone of the Cuban form is more dome-like than that of *Clypeorbis*.

OMPHALOCYCLUS Bronn, 1853

TYPE REFERENCE:—Bronn, H. G., Lethaea Geognostica, ed. 3, Vol. II, Part 5, 1853, p. 95.

TYPE:—(monotypic) *Orbulites macropora* Lamarck. Lamarck, M. le chevalier de, Hist. Anim. sans Vert., Vol. 2, 1816, p. 197.

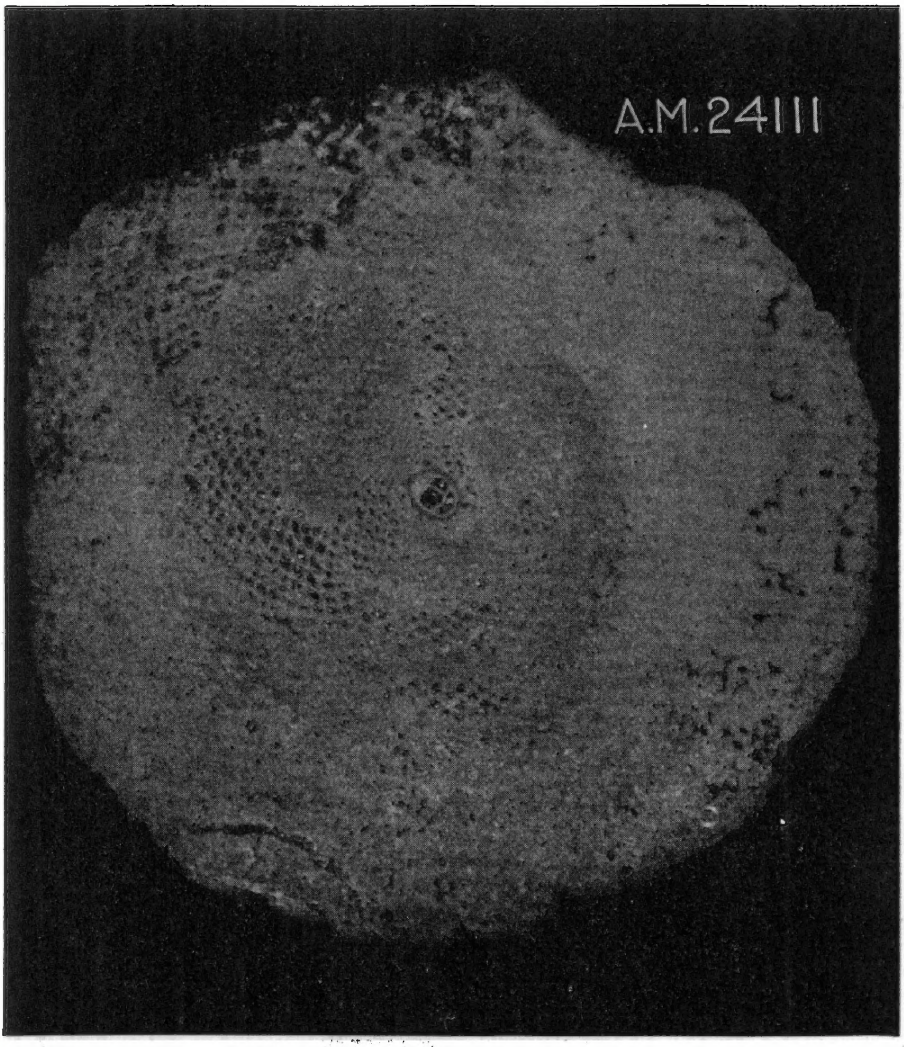

Figure 7.—Horizontal section of *Gallowayina browni*, new genus, new species. ×15. American Museum No. 24,111.

TYPE DESCRIPTION:—"Schaale kalkig, frei, kreisrund, beiderseits gleich und vertieft; bestehend aus einer mitteln Scheidenwand, welche im Innern zellig und auf beiden Seiten mit bogenförmigen Radial-Rippen in sich kreutzender Richtung (wie Elfenbein) durchzogen ist, zwischen denen rautenförmige Lücken-Zellen übrig bleiben, von welchen die auf den Seiten mit einer Kalkhaut überzogen oder inkrustirt und nur die in der Nähe des Randes gelegenen offen sind. Die Zellchen der nach dem Umfang hin sich verdickenden Mittelwand bilden viele konzentrische Kreise um einander und

nächst dem Rande auch in mehren Schichten auf einander; sie scheinen durch Kanäle mit den oberflächlichen Zellen in Verbindung zu stehen. Gehört wohl schon zu den Bryozoen bei *Lunulites*."

This form is discoidal, thin in the middle and thickening toward the edge, consisting, in the central portion, of a single layer of chambers which soon bifurcate to form two, and between which a little farther out a third layer is intercalated. The chambers of the median layer are arranged in annulæ and those of the lateral layers in intersecting curves. Each chamber communicates by means of a pore with each of the two preceding and the two succeeding chambers, and with the chambers adjoining it laterally. The microspheric nucleoconch consists of a planispiral coil, the megaspheric one of four subequal chambers surrounded by a thick wall. The walls are calcareous, the lateral ones of each chamber being conspicuously perforate, while the walls between chambers are fibrous and imperforate. The walls between the chambers are raised and thickened at the surface. The apertures consist of round pores in three or five rows on the periphery of the test. The diameter ranges from 2 to 12 mm.

Omphalocyclus macropora (Lamarck), 1816

Figures 8 and 9

TYPE REFERENCE:—Lamarck, M. le chevalier de, Hist. Anim. sans Vert., Vol. 2, 1816, p. 197.

TYPE:—None.

TYPE FIGURE:—None.

TYPE LOCALITY AND LEVEL:—Upper Cretaceous, Maestrichtian, Maestricht, Holland.

TYPE DESCRIPTION:—"*Orbulite macropore, Orbulites macropora.* O. complanata, centro depressa; poris utroque latere majusculis. Habite . . . fossile de . . . Mon cabinet.

That this form occurs in America is shown by the presence of specimens in material from the orbitoid series, immediately overlying the Cretaceous, on the Anaya River, 1 kilometer below Baños, Cuba. Horizontal and vertical sections have been made and deposited in the American Museum of Natural History. They bear the specimen numbers 24,-114 and 24,114-a respectively. These individuals represent the only occurrence of this genus and species in the western hemisphere, recorded to date.

Externally the specimens show little beyond the general form, which is discoidal, thin in the middle and thickening toward the periphery. The surface ornamentation, consisting of intersecting arcs of rhombs, is not in evidence in these specimens, due to the fact that they have been strongly eroded. This pattern, which represents the

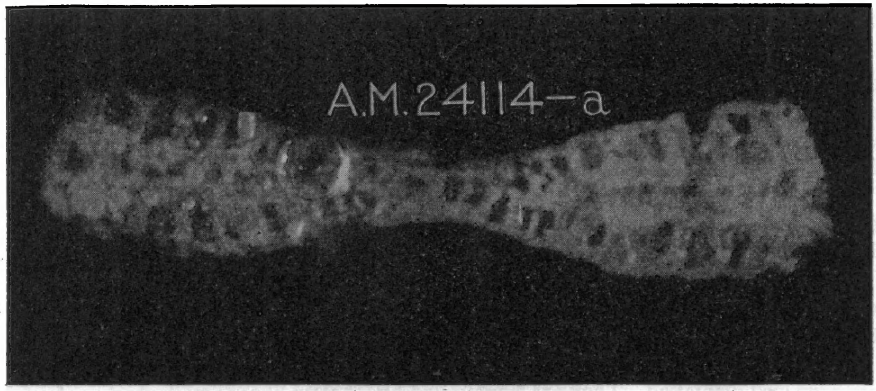

Figure 8.—Vertical section of *Omphalocyclus macropora* (Lamarck). ×25. American Museum No. 24,114-*a*.

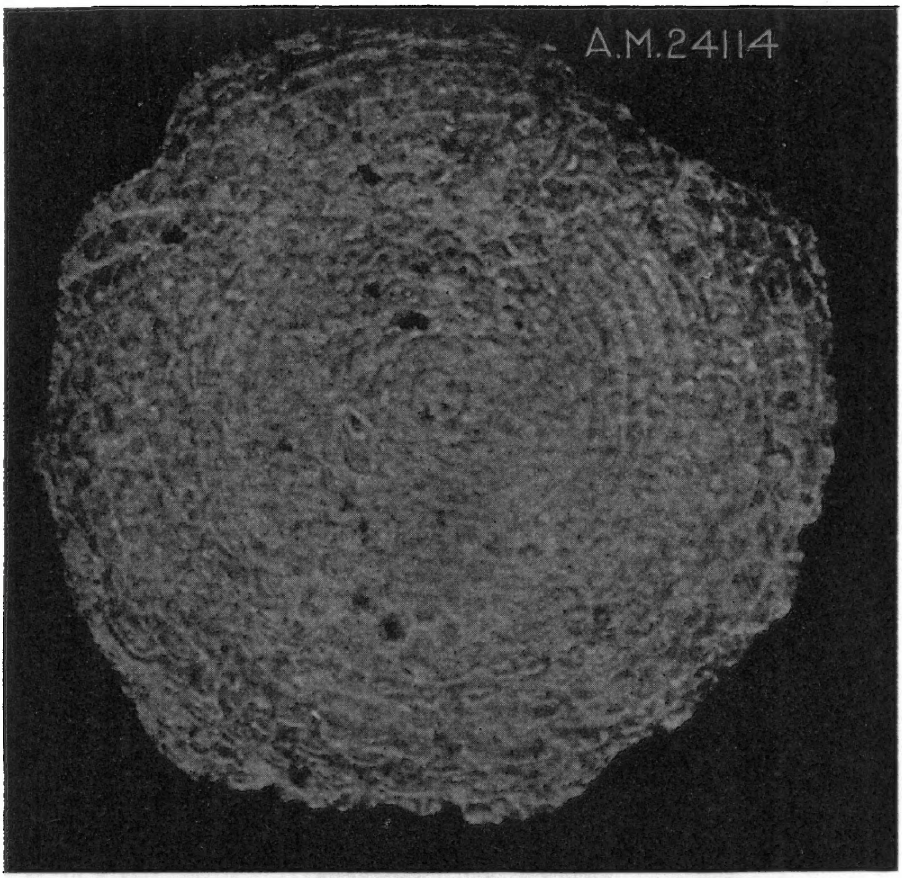

Figure 9.—Horizontal section of *Omphalocyclus macropora* (Lamarck). ×30. American Museum No. 24,114.

elevated edges of the lateral chambers, was apparent, however, on the removal of the outer wall. The three layers of chambers are clearly indicated at the periphery. The diameter is 4 mm., with a thickness of 1 mm. Both specimens are of the megaspheric form.

In vertical section the general arrangement of the layers is shown. In the central portion there is a single layer which bifurcates a short distance from the nucleoconch. Between these two zones thus formed is interposed a third or median zone of chambers. The individual chambers of both the lateral and median zones are rather irregular, but most of them show flattening on the peripheral border. The general form of the cavities is much altered by the presence of secondary deposits.

In horizontal section the four subequal chambers of the megaspheric nucleoconch are very well displayed. They are surrounded by a heavy fibrous wall which in turn is succeeded by the annulæ of the median zone. The median chambers are of the flattened open arcuate type, often rather irregular. As seen in this section the walls consist of three layers, an inner, thin dark layer flanked on either side by thick porous layers which are light in color. There is an aperture at either end of each chamber which connects it with the preceding and succeeding chambers of the same annulus, and also with the chambers of the preceding and succeeding annulæ. The chambers in adjacent annulæ alternate in position.

LEVEL:—Upper Eocene of Cuba. *Omphalocyclus macropora* is known only from the Maestrichtian, but in the Cuban locality it is associated with Upper Eocene forms. The Upper Eocene rests directly on the Cretaceous in this locality.

LOCALITY:—The orbitoid series, immediately overlying the Cretaceous, on the Anaya River, 1 kilometer below Baños, Cuba.